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ABSTRACT

A battery of work sample tests, the Micro-TOWER System of Vocational Evaluation, has been developed for use in vocational and career education programs. Verbal, numerical, and perceptual motor skills useful in various occupations are measured. The system has been field tested in vocational rehabilitation centers, prisons, schools, and psychiatric hospitals. Data are presented on 100 adolescents and young adults from a New York City rehabilitation center who were given the tests. The instructions were played from a cassette tape, to minimize the amount of reading ability necessary to complete the test. The construct validity of these work samples, and the extent to which verbal ability affected performance, were examined. The results indicated that the work samples, with few exceptions , measured those skills which they were designed to measure,. In addition, verbal ability was minimally involved. Intercorrelations are presented for the various sections of Micro-TOWER, and for the skills measured by Micro-TOWER as compared to the Fundamental Achievement Series and the Employment Aptitude Survey. (Author/GDC)

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Examination of the Aptitudes Measured by Work Samples in the Micro-TOWER Evaluation System

by

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Educational Importance of the Study

Currently there is a need for new assessment tools for use in career education, vocational training, and special education programs. Many school systems have begun using work samples as supplementary tools to assess vocational abilities because of the unique advantages they offer. First of all, their face validity makes them appealing to students who feel threatened by, or have been turned off by, traditional paper and pencil tests. Secondly, as has been demonstrated in this study, work samples can be designed to be relatively independent of verbal skills; hence, they are particularly useful for assessing specific aptitudes of students who have poor reading skills. Finally, because of the "real-life" nature of work sample tasks, the task of assessing student's suitability for specific careers and/or special vocational curricula is made easier; and the task of counseling becomes more direct and straightforward.

Of course, any tests used for vocational purposes must be psychometrically sound and must demonstrably measure specific, relevant aptitudes. With these considerations in mind, the content of the different Micro-TOWER work samples was carefully selected; and standardized methods of group administration and objective scoring were developed. Traditionally, in the field of vocational rehabilitation where work samples have been used the most, little attention has been paid to these psychometric issues. However, the results reported

here demonstrate that when concern is given to psychometric issues in designing a new work sample system, satisfactory measurement properties can be obtained; thus rendering the work sample approach an attractive one to the field of education.

Summary

Educators have been looking for new tests for use in career education and special education programs, and interest has increasingly been directed toward work samples. A new battery of work samples, called Micro-TOWER, has been designed to measure verbal, numerical, and perceptual motor skills. The purpose of this study was twofold: to examine the construct validity of these work samples, and to assess the extent to which reading ability affects performance. Results indicate that, with few exceptions, the work samples do measure those skills they were designed to measure; in addition, reading ability is minimally involved.

Examination of the Aptitudes Measured by Work Samples in the Micro-TOWER Evaluation System

The purpose of this study was to examine evidence relating to the construct validity of the new battery of work samples known as Micro-TOWER. The thirteen Micro-TOWER work samples were designed to measure major aptitudes important in vocational education, training and placement. Traditionally, most work samples have been designed to measure specific abilities required for specific jobs. The Micro-TOWER battery, however, is essentially an aptitude battery, comprised of work samples or performance tests. At the same time, these tests have high face validity in that each resembles actual work tasks.

The present study has a twofold purpose: To see if the work samples do indeed measure those abilities tnat they were designed to measure; and related to this, to see if the level of reading comprehension, has been kept to a minimum in those work samples designed to measure nonverbal skills.

The Micro-TOWER System

The Micro-TOWER System of Vocational Evaluation was developed at the ICD Rehabilitation and Research Center. The system was field tested in 1976 in 18 sites around the country, including rehabilitation centers, prisons, schools, and psychiatric hospitals. The field testing was funded by a grant from the Rehabilitation Services Administration of HEW.

The system includes thirteen work samples, as well as group discussion sessions and presentations of occupational information. The work samples are usually administered to small groups and a complete evaluation can be completed in a period of from two to five days. Instructions and scoring procedures are standardized. The work samples and the aptitude areas they were designed to assess are presented in Table 1.

Each work sample has a practice period followed by an evaluation period. The instructions are on cassette tape, however, during the practice period the evaluator can stop the tape whenever it is necessary to further explain or demonstrate a procedure. No help is given during the evaluation period.

One reason for putting the instructions on tape, besides the intent to standardize administration, was to minimize the amount of reading ability required. Many tests of special abilities involve a relatively high level of skill in English, although their primary purpose is to assess nonverbal skills. By removing the necessity to read English, except where the ability realistically is required, a clearer picture of the person's nonverbal aptitudes should emerge.

Correlations between the Micro-TOWER work samples and these tests were computed, as were the intercorrelations between the FAS and EAS tests.

The Study

The subjects in this study were 100 adolescents and young adults, who had been referred to a rehabilitation center in New York City for voca-

tional evaluation. During the first week at the center they were given the Micro-TOWER work samples. Intercorrelations amongst the Micro-TOWER work samples were computed. Some of the rehabilitation clients were also given the Fundamental Achievement Series (FAS) Verbal and Numerical tests, published by the Psychological Corporation; and the Employment Aptitude Survey (EAS, Verbal Comprehension, Verbal Reasoning, and Spatial Visualization tests, published by Psychological Services, Inc.

Results and Conclusions

The correlations are reported in Tables 2-4: Table 2 presents the intercorrelations of the Micro-TOWER work samples; Table 3, the correlations of the Micro-TOWER work samples with the FAS and EAS tests; Table 4, the intercorrelations of the FAS and EAS tests.

The first research question was: Do the Micro-TOWER work samples measure the aptitudes the publishers claim they measure? Examination of the correlation matrices indicates that with a few exceptions the work samples tend to fit the model as outlined in Table 1.

Fairly distinct grouping of tests were noted: Those work samples heavily dependent upon verbal skills; those measuring motor skills, and those measuring perceptual/spatial skills. The work samples in the verbal skills area were Want Ads Comprehension, Message-Taking, and Zip Coding. Zip Coding was originally designed as a clerical activity in the perceptual-motor skills area; however, examination of the data, was well as observations of

persons taking the work sample, suggest that this work sample is probably more a measure of general reasoning ability.

The work samples that correlated most highly with each other to form the motor skills grouping are the same as those in the original model outlined in Table 1: Lamp Assembly, Electronic Connector Assembly, and Bottle Capping and Packing.

The nonverbal perceptual/spatial grouping is composed of Blueprint Reading and Graphics Illustration. In the model the perceptual skills grouping included both spatial and clerical perception. Some restructuring of the model may be necessary here, but will wait further analysis based on additional data. The pattern of intercorrelations of the Graphics work sample, as expected, reveals a combination of perceptual, motor, and reasoning skills.

In the numerical group, Making Change and Payroll Computation had an intercorrelation of .68. Payroll Computation had the highest correlation of any of the work samples with the FAS Numerical test (.65); however, Making Change only correlated .29 with that test. It should be noted that the FAS Numerical test does have a relatively high correlation with the FAS Verbal test (.52) and the EAS Verbal Comprehension test (.67; see Table 4). Thus, the low validity coefficient for Making Change may be reflecting the relatively high verbal component in the FAS Numerical test.

The second research question involved the degree to which the Micro-TOWER work samples are dependent upon verbal ability. Examination of Table 3 indicates that verbal ability, as traditionally measured by paper

and pencil tests, has importance in only those Micro-TOWER work samples that specifically require verbal skill. Thus, Want Ads and Message Taking correlated .43 and .37, respectively, with the FAS Verbal test, and .49 and .31, respectively, with the EAS Verbal Comprehension test. The Payroll and Mail Sorting work samples also had some dependency on verbal comprehension ($r = .44$); the tasks in both of these work samples require some reading.

Reasoning ability, as evidenced by the EAS Verbal Reasoning test, seems to play some role in Zip Coding, Graphics Illustration, and Filing ($r = .41$, .40, and .43, respectively). Correlations were very low between the motor skills work samples and the paper and pencil verbal tests (ranging from -.02 to .20).

Summary

In general the Micro-TOWER work samples seem to be measuring specific aptitudes in the areas of verbal, numerical, motor, and perceptual ability. Most of the work samples are measuring specific aptitudes in the areas of verbal, numerical, motor, and perceptual ability. Most of the work samples are measuring primarily those abilities they were designed to measure although there are a few, such as Zip Coding, that will have to be reclassified in relation to the original model. With the exception of those work samples specifically designed to depend in part on verbal ability, the Micro-TOWER work samples do not require a high level of verbal ability.

Table 1

Aptitudes Assessed by Micro-TOWER Work Samples

WORK SAMPLES	PRIMARY APTITUDE	MEASURABLE BEHAVIOR
	MOTOR SKILLS	
Electronic Connector Assembly	finger dexterity	# of small pins placed in plastic housing
Bottle Capping & Packing	manual dexterity	# of bottles capped and packed
Lamp Assembly	motor coordination	# of hand tool operations performed correctly
	PERCEPTUAL/MOTOR SKILLS	
Filing	clerical perception/ motor coordination	# of sets of cards filed correctly
Mail Sorting	clerical perception/ manual dexterity	# of envelopes sorted correctly
Graphics Illustration	motor coordination/ spatial reasoning	# of lines drawn correctly using drafting tools
	PERCEPTUAL SKILLS	
Blueprint Reading	spatial reasoning	# of measurements correctly identified based on reading blueprints
Zip Coding	clerical perception	# of zip codes looked up correctly using zip code directory
Record Checking	clerical perception	# of items checked correctly
	NUMERICAL SKILLS	
Making Change	numerical reasoning & figuring change	# of times change is made correctly for a "sale"
Payroll Computation	numerical computation/ basic arithmetic skills	# of correct computations using the 4 basic arithmetic operations
	VERBAL SKILLS	
Want Ads Comprehension	verbal comprehension	# of questions about ads answered correctly
Message Taking	verbal comprehension & usage	# of essential parts of messages transcribed correctly from simulated telephone calls

Table 2

Intercorrelations of Micro-TOWER Work Samples[a]

	MT	ZC	MS	FI	RCS	RCA	BR	GI	PC	MC	BOT	ELC	LA
Want Ads	82	74	70	68	43	25	55	46	64	56	35	28	19
Message Taking	--	83	75	80	57	22	67	57	71	66	38	36	32
Zip Coding	--	--	71	72	65	27	63	52	76	57	42	41	43
Mail Sorting	--	--	--	59	67	25	52	47	69	60	40	35	28
Filing	--	--	--	--	57	41	61	50	76	60	30	24	27
Rec. Ch. speed	--	--	--	--	--	21	54	42	58	55	52	43	56
Rec. Ch. acc.	--	--	--	--	--	--	10	18	24	14	09	-01	05
Blueprint Rdg.	--	--	--	--	--	--	--	57	62	66	39	34	43
Graphics Ill.	--	--	--	--	--	--	--	--	56	69	50	41	46
Payroll Comp.	--	--	--	--	--	--	--	--	--	68	33	26	35
Making Change	--	--	--	--	--	--	--	--	--	--	48	34	40
Bottles	--	--	--	--	--	--	--	--	--	--	--	80	76
Elec. Conn.	--	--	--	--	--	--	--	--	--	--	--	--	61
Lamp Assem.	--	--	--	--	--	--	--	--	--	--	--	--	--

Note. Subjects were adolescent and young adult clients in a rehabilitation center; n varies from 65-93 because of missing data.

[a]Decimals omitted.

Table 3

Correlations of Micro-TOWER Work Samples with Fundamental Achievement Series (FAS) and Employment Aptitude Survey (EAS) Tests[a]

	FAS		EAS		
	Verbal	Numerical	Verbal Comp.	Verbal Reasoning	Spatial Visualization
Want Ads Comp.	43 (89)	48 (54)	49 (44)	39 (41)	36 (73)
Message Taking	37 (96)	41 (59)	31 (49)	18 (46)	31 (78)
Payroll Comp.	39 (82)	65 (51)	44 (42)	38 (40)	33 (69)
Making Change	28 (81)	29 (90)	21 (50)	21 (47)	30 (60)
Bottles	20 (80)	12 (49)	15 (40)	15 (38)	31 (68)
Electronic Conn.	01 (98)	07 (61)	01 (51)	-01 (48)	07 (80)
Lamp Assembly	04 (100)	04 (61)	-02 (51)	02 (48)	12 (82)
Filing	27 (91)	45 (55)	25 (45)	43 (42)	34 (74)
Graphics Ill.	32 (46)	42 (43)	30 (38)	40 (35)	45 (36)
Mail Sorting	39 (83)	46 (56)	44 (48)	37 (45)	33 (70)
Rec. Ch. accuracy	25 (83)	22 (56)	15 (48)	25 (45)	19 (72)
Rec. Ch. speed	29 (83)	34 (56)	26 (48)	24 (45)	20 (72)
Blueprint Reading	33 (86)	50 (56)	36 (48)	39 (45)	52 (73)
Zip Coding	32 (81)	40 (52)	32 (44)	41 (42)	29 (69)

Note. Subjects were adolescents and young adult clients in a rehabilitation center; numbers in parentheses indicate number of persons tested.

[a]Decimals omitted.

Table 4

Intercorrelations of Fundamental Achievement Series (FAS) and Employment Aptitude Survey (EAS) Tests[a]

	FAS		EAS		
	Verbal	Numerical	Verbal Comp.	Verbal Reasoning	Spatial Visualization
FAS Numerical	52 (61)		48 (51)	46 (48)	40 (53)
EAS Verbal Comprehension	67 (51)	48 (51)		30 (45)	34 (47)
Verbal Reasoning	36 (48)	46 (48)	30 (45)		41 (47)
Spatial Visualization	32 (82)	40 (53)	34 (47)	41 (47)	

Note: Subjects were adolescents and young adult clients in a rehabilitation center; numbers in parentheses indicate number of persons tested.

[a]Decimals omitted.